CLAIMS

1. A spherical slip joint comprising:

(a) a metal female joint surface having a spherical seating surface;

(b) a metal male joint surface having a spherical contact surface, the contact surface selected to engage the seating surface;

(c) a coating on the seating surface and the contact surface, the coating including a metal and less than 10% by weight non reactive grit, the coating having an Ra_{max} between 50 microinches and 250 microinches,

the coated female joint surface and the coated male joint surface engaged to form a sealed interface there between.

2. The spherical slip joint of Claim 1, wherein the female joint surface and the male joint surface are stainless steel.

3. The spherical slip joint of Claim 1, wherein the coating has less than 5% by weight non reactive grit.

4. The spherical slip joint of Claim 1, wherein the coated female joint surface and male joint surface are engaged in an as formed state.

5. A spherical slip joint comprising:

(a) a metal female joint surface having a spherical seating surface;

(b) a metal male joint surface having a spherical contact surface, the contact surface selected to engage the seating surface;

(c) an unfinished surface coating on the seating surface and the contact surface, the unfinished surface coating including metal and less than 10% by weight non reactive grit, the coating having an Ra_{max} between 50 microinches and 250 microinches.

6. The spherical slip joint of Claim 5, wherein the surface coating has a bond strength with one of the seating surface and the contact surface greater than 10,000 psi.

7. A method of forming a surface coating on confronting spherical surfaces, the surfaces defining a sealed interface there between, the method comprising:

(a) impacting each of the confronting spherical surfaces with a mixture of a given density on the confronting surfaces, the mixture comprising chromium, cobalt,

iron, and silicon, and a ceramic/non-reactive grit, to form a surface coating, the surface coating having a density greater than the given density; and

(b) engaging the confronting surfaces to form a sealed interface there between.

8. The method of Claim 7, further comprising impacting each of the confronting spherical surfaces with aluminum oxide as the ceramic grit.

9. The method of Claim 7, further comprising impacting each of the confronting spherical surfaces with a mixture having less than 5% by weight non-reactive grit.

10. The method of Claim 7, further comprising impacting each of the confronting spherical surfaces with a mixture at a temperature less than a melting point of the non-reactive grit and at a velocity sufficient to bond at least a portion of the chromium, cobalt, iron, and silicon to the substrate.

11. A method of forming a surface coating on a substrate, the method comprising:

(a) impacting the substrate with a mixture of a metal particles and aluminum oxide at a temperature less than a melting point of the aluminum oxide and at a velocity sufficient to bond at least a portion of the metal particles to the substrate.

12. The method of Claim 11, wherein the temperature of the mixture is less than 5000 °F.

13. The method of Claim 11, wherein the velocity of the mixture is greater than 600 meters/second.

14. A method of forming a sealed interface between two confronting surfaces, the method comprising:

(a) impacting each of the confronting surfaces with a mixture of metal powder and a non reactive grit to form a surface coating, the mixture having a given hardness and the surface coating having a hardness greater than the given hardness; and

(b) contacting the surface coatings to form a sealed interface.

15. The method of Claim 14, further comprising forming the mixture with between 70% to 90% by weight metal powder and between 30% to 10% by weight non reactive grit.

16. The method of Claim 14, further comprising forming the mixture with the metal powder having a particle size between 5μm and 135μm.

17. The method of Claim 14, further comprising forming the mixture with the non reactive grit having a particle size between 5μm and 135μm.

18. A method of forming a sealed interface between confronting surfaces,

(a) forming a coating having a density greater than 8g/cc and an R_A between 50 microinches and 250 microinches on each of the confronting surfaces, from impacting a mixture having a density less than 8g/cc; and

(b) maintaining the surfaces in a sufficient contacting relationship to form a sealed interface between the coated confronting surfaces.

19. The method of Claim 18, further comprising contacting the coated surfaces prior to surface treating the coated surfaces.

20. A method of forming a sealed interface between confronting surfaces in a spherical slip joint subject to vibratory movement, the method comprising:

(a) impacting a metal powder and a non reactive grit mixture onto the confronting surfaces at a velocity to form a metal layer on the confronting surface and substantially preclude chemical reaction between the metal powder and the grit.

21. The method of Claim 20 further comprising forming the metal powder to include chromium, iron and cobalt.

22. A method of forming a sealed interface between confronting surfaces in a spherical slip joint subject to vibratory movement, the method comprising:

(a) impacting a mixture of metal powder and a non reactive grit mixture of a given density onto the confronting surfaces at a velocity to form a surface coating on the confronting surface, the surface coating having a hardness greater than the given hardness.

23. A method of forming a surface coating on a substrate, the method comprising:

(a) impacting the substrate with metal particles at a temperature less than a melting point of the metal particles and at a velocity sufficient to bond at least a portion of the metal particles to the substrate.

24. The method of Claim 23, wherein the temperature of the metal particles maintained below 5000 °F.

25. The method of Claim 23, wherein the velocity of the metal particles is greater than 600 meters/second.

26. A method of forming a surface coating on a substrate, the method comprising:

(a) impacting the substrate with a mixture of a metal particles and a non metallic grit at a temperature less than a melting point of the grit and at a velocity sufficient to bond at least a portion of the metal particles to the substrate.

27. The method of Claim 26, wherein the temperature of the mixture is less than 5000 °F.

28. The method of Claim 26, wherein the velocity of the mixture is greater than 600 meters/second.